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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/035,444	01/04/2002	Fumikazu Yamaki	011796	3015

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EXAMINER

TRAN, TAN N

ART UNIT	PAPER NUMBER
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2826

DATE MAILED: 06/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/035,444

Applicant(s)

YAMAKI ET AL.

Examiner

TAN N TRAN

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on amendment filed on 04/21/03.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☒ Claim(s) 10 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8, as now amended, are rejected under 35 U.S.C. 103(a) as being anticipated by Ishikawa (6,294,446) in view of Udagawa et al. (6,462,361).

With regard to claims 1,2, Ishikawa discloses high electron mobility transistor for use in a radio-frequency amplifier comprising a compound semiconductor substrate 31; a supper lattice buffer layer 32 formed on the compound semiconductor substrate 31; and an InGaAs channel layer 34 formed formed on the buffer layer 32 and having an active element (e.g. lower and upper wide-band gap layers 33/35) formed therein. (Note lines 12-16, fig. 1 of Ishikawa).

Ishikawa does not disclose the compound semiconductor substrate having a resistivity less than 1.0×10^{18} Ohm-cm at least at a surface.

However, Udagawa et al. discloses a semiconductor device comprising a compound semiconductor substrate 111 having a resistivity of 10^7 Ohm-cm. (Note lines 64-67, column 17, figs. 8,9 of Udagawa et al.).

Therefore, it would have been obvious to one of ordinary skill in the art to form the Ishikawa's device having a compound semiconductor substrate 111 having a resistivity of 10^7 Ohm-cm such as taught by Udagawa et al. in order to reduce the concentration of channel layer formed on the semiconductor substrate.

Applicant's claim 1 does not distinguish over Udagawa et al. and Ishikawa regardless of the type of the semiconductor device is a high power semiconductor device, because the recitation "high power" has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

With regard to claim 3, Udagawa et al. and Ishikawa disclose all the claimed subject matter except for the active layer is formed at a position within 5.0 micrometer from a surface of the compound semiconductor substrate. However, it would have been obvious to one of ordinary skill in the art to form the active layer is formed at a position within 5.0 micrometer from the surface of the compound semiconductor substrate in order to maintain the lattice matching between the semiconductors and the sapphire substrate.

With regard to claims 4,5, Udagawa et al. and Ishikawa disclose all the claimed subject matter except for an electrode formed on another surface of the compound semiconductor substrate and not electrically connected to the semiconductor device. However, it would have been obvious to one of ordinary skill in the art to form an electrode formed on another surface of the compound semiconductor substrate and not electrically connected to the semiconductor device in order to provide potential for semiconductor device.

With regard to claim 6, Udagawa et al. and Ishikawa disclose all the claimed subject matter except for the electrode layer is connected to one power supply potential of the

semiconductor device. However, it would have been obvious to one of ordinary skill in the art to connect the lower electrode layer to one power supply potential of the semiconductor device in order for the device to operate.

With regard to claim 7, Udagawa et al. discloses a source electrode 128 and drain electrode 129 formed on the active layer 124, separated from each other so as to establish a channel region, and a gate electrode 120 formed above the channel region 124. (Note fig. 9 of Udagawa et al.)

With regard to claim 8, Udagawa et al. discloses the channel layer 124 has 2 dimensional electron gas. (Note lines 56-60, column 31 of Udagawa et al.).

Claim 9 is rejected under 35 U.S.C. 103(a) as being anticipated by Ishikawa (6,294,446) in view of Udagawa et al. (6,462,361) and further in view of Usagawa et al. (5,373,191).

With regard to claim 9, Udagawa et al. (6,462,361) and Ishikawa do not disclose the active layer comprises: a collector layer of a first conducting type; a base layer of a second conducting type formed on the collector layer; an emitter layer of the first conducting type formed on the base layer.

However, Usagawa et al. (5,373,191) discloses the active layer comprises: an n-type collector layer 101, a p-type base layer 103, and an n-type emitter layer 105. (Note figs. 12a-12c and embodiment 6 in column 10 of Usagawa et al.).

Therefore, it would have been obvious to one of ordinary skill in the art to form the Ishikawa and Nitta's device having the active layer comprises: an n-type collector layer, a p-

type base layer, and an n-type emitter layer such as taught by Usagawa et al. in order for forming the bipolar transistor.

Allowable Subject Matter

2. Claim 10 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 10 is allowable over the prior art of record, because none of these references disclose or can be combined to yield the claimed invention such as the compound semiconductor substrate has a resistivity more than 1.0×10^8 Ohm-cm in total.

Response to Amendment

3. Applicant's arguments with respect to claims 1-9 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from

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the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


6. Any inquiry concerning this communication or earlier communication from the examiner should be directed to Tan Tran whose telephone number is (703) 305-3362. The examiner can normally be reached on M-F 8:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (703) 308-6601. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for after final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

TT

May 2003


Minhloan Tran
Primary Examiner
Art Unit 2826